

Claims

1. An adjustable resistance valve for a cerebrospinal fluid shunt system comprising:
an actuator allowing the selection of the resistance to flow of the valve;
5 means for selecting at least one passage across the valve; and
a resistance system comprising a set of passages each defining a different
resistance to flow, the passages being disposed in a circle facing said selecting means,
such as to guide the flow of the cerebrospinal fluid traversing said at least one passage of
the selecting means through the selected passage of the resistance system, said actuator
10 enabling to change the relative position of the selecting means with respect to the
resistance system by a rotational movement to select the desired resistance of the valve.
2. The valve according to claim 1, wherein the resistance system is a set of tubes each
having an identical internal diameter but a different length, said tubes being parallel to
15 each other, an opening of each tube being disposed in a circle corresponding to the
rotational movement of the passage of the selecting means.
3. The valve according to claim 1 wherein the resistance system is a body of
essentially cylindrical shape comprising a set of passages each having an identical internal
20 diameter but a different length, the passages being disposed such as to form a set of
passages parallel to each other and to the axis of the body, with the openings of the
passages facing the rotational path of the passage of the selecting means, the body of
essentially cylindrical shape comprising on its one end a recess of helicoidal shape, on the
surface of which the passages depart, in order to obtain different lengths of the passages.
25
4. The valve according to claim 1 wherein the resistance system is a set of tubes each
having the same length but each having a different internal diameter, said tubes being
disposed parallel to each other, the openings being disposed in a circle corresponding to
the rotational movement of the passage of the selecting means.
30
5. The valve according to claim 1 wherein the resistance system is a cylindrical body
comprising a set of passages each having all the same length but each having a different
internal diameter, the passages being disposed such as to form a set of passages parallel to

each other and to the axis of the body, with the openings of the passages facing the rotational path of the passage of the selecting means.

6. The valve according to claim 2, wherein the lengths of the tubes are chosen in such a manner as to define the total resistance to cerebrospinal fluid flow of a corresponding shunt system and to cover a range of resistance to flow of 0 - 50 mm Hg/ml/min.

7. The valve according to claim 3, wherein the lengths of the passages are chosen in such a manner as to define the total resistance to cerebrospinal fluid flow of a corresponding shunt system and to cover a range of resistance to flow of 0 - 50 mm Hg/ml/min.

8. The valve according to claim 1 wherein the selecting means is a disc comprising at least one passage traversing the disc in a direction parallel to its longitudinal axis.

9. The valve according to claim 8 wherein the passages of the resistance system are parallel to said axis.

10. The valve according to claim 1 wherein the actuator comprises a motor connected to one of the selecting means and the resistance system in order to drive a relative rotational movement of the selecting means with respect to the resistance system; an energy source, and corresponding electronics that drive the motor, provide feedback to a user about the actual relative position of the selecting means with respect to the resistance system and manage the energy consumption of the actuator.

11. A cerebrospinal fluid shunt system comprising:
 a proximal catheter to be introduced in the ventricles of the brain and allowing the draining of cerebrospinal fluid from the ventricles;
 a distal catheter to be introduced in a distal resorption site such as the atrium, the peritoneum or the sagittal sinus and allowing drainage of cerebrospinal fluid into this site;
 and

a main body of the shunt being connected at one end to said proximal catheter and at the other end to said distal catheter, the main body houses an adjustable resistance valve comprising an actuator allowing the selection of the resistance to flow of the valve, means

for selecting at least one passage across the valve, and a resistance system comprising a set of passages each defining a different resistance to flow, the passages being disposed in a circle facing said selecting means such as to allow the flow of the cerebrospinal fluid traversing said at least one passage of the selecting means through the selected passage of the resistance system, said actuator enabling to change the relative position of the selecting means with respect to the resistance system by a rotational movement to select the desired resistance of the valve.

12. A cerebrospinal fluid shunt system according to claim 11 wherein the main body is a housing for said valve, which regulates the flow of cerebrospinal fluid through the main body according to the relative position of the selecting means with respect to the resistance system, one of said selecting means and said resistance system being disposed inside the main body such as to allow its rotation but to exclude any fluid to pass elsewhere than through the passage formed in the selecting means and the selected passage of the resistance system.

13. A cerebrospinal fluid shunt system according to claims 11 further comprising a check valve in fluid communication with the main body for avoiding back flow of cerebrospinal fluid into the ventricles of the brain.

14. A method of treatment of hydrocephalus with a cerebrospinal fluid shunt system comprising a proximal catheter to be introduced in the ventricles of the brain and allowing the draining of cerebrospinal fluid from the ventricles, a distal catheter to be introduced in a distal resorption site such as the atrium, the peritoneum or the sagittal sinus and allowing drainage of cerebrospinal fluid into this site, and a main body of the shunt being connected at one end to said proximal catheter and at the other end to said distal catheter, said main body housing an adjustable resistance valve comprising an actuator allowing the selection of the resistance to flow of the valve, device for selecting at least one passage across the valve, and a resistance system comprising a set of passages each defining a different resistance to flow, the passages being disposed in a circle facing with selecting device to allow the flow of the cerebrospinal fluid traversing the at least one passage of the selecting device through the selected passage of the resistance system, the actuator enabling changing the relative position of the selecting device with respect to the resistance system by a rotational movement to select the desired resistance of the valve;

said method comprising the steps of:

implanting a cerebrospinal fluid shunt system into a patients cranium; and
guiding the catheters to the chosen resorption sites.